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Control of Apple Tree Borers

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U. S. DEPARTMENT OF AGRICULTURE

THE FLATHEADED APPLE TREE BORER, the roundheaded apple tree borer, and the shot-hole borer are serious pests of apple trees in the United States. They may also attack certain other fruit trees, as well as some shade and forest trees and shrubs.

This leaflet tells how to recognize each of these borers by its appearance and by the injury that it causes. It also tells about their habits and how and when to apply control measures for best results. Some of this information originally appeared in the following publications of the Department of Agriculture, all by Fred E. Brooks:

Farmers' Bulletin 675, The Roundheaded Apple-Tree Borer. 1915.

Farmers' Bulletin 763, Orchard Barkbeetles and Pinhole Borers and How to Control Them. 1916.

Farmers' Bulletin 1065, The Flatheaded Apple Tree Borer. 1919.

These bulletins are superseded by this leaflet.

Washington, D. C. Issued June 1950

CONTROL OF APPLE TREE BORERS

Prepared by the Division of Fruit Insect Investigations, *Bureau of Entomology and Plant Quarantine, Agricultural Research Administration*

Several kinds of insects bore into the wood of fruit trees in various parts of the United States. These borers are the larvae, or grubs, of beetles or moths. Their burrowing may weaken the tree, and even girdle it completely, causing it to die. The most important borers that attack apple trees are the flatheaded apple tree borer, the roundheaded apple tree borer, and the shot-hole borer. These three kinds also infest other deciduous fruit, as well as certain shade and forest trees. The control measures given in this bulletin may be used on all infested trees.

The Flatheaded Apple Tree Borer

The flatheaded apple tree borer[1] (fig. 1) is probably the most common borer attacking apple trees. It occurs throughout most of the United States and in southern Canada. It generally attacks trees that have recently been transplanted, are retarded in growth, or have bark that has been damaged by tools or by disease, sun scald, or animals or other insects. Trees that are vigorous and have sound, healthy bark are rarely injured by this borer.

This insect injures trees only when it is in the larval stage. Soon after hatching the young larvae bore into the bark of the trunk or larger branches and feed between the bark and sapwood. In young trees they feed chiefly in the sapwood, and the wound is likely to be long and narrow, often encircling the tree and killing it. In older trees they feed mostly in the thick inner bark, and the wound is more or less circular in outline. A wound may be enlarged year after year by new broods of borers. Injured spots can often be detected by the darker color and slight depression of the bark.

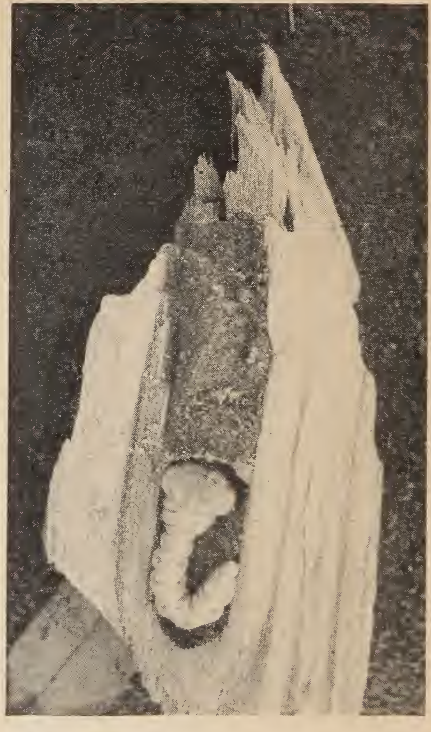

Figure 1.—Flatheaded apple tree borer feeding in wood of apple tree.

Appearance and Development

The flatheaded apple tree borer is so called because just back of the head is a broad, flat enlargement which gives it a "flatheaded" appearance. It is a yellowish-white footless grub about 1 inch long when full grown (fig. 1). It is generally found curved in the shape of a horseshoe.

The newly hatched larvae usually enter the bark at the place where the eggs were deposited. If the tree is vigorous and full of sap, the borers may soon die or they may live a year or longer, but if it is already weakened, they develop rapidly.

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[1] *Chrysobothris femorata* (Oliv.).

Late in the summer, when the borers are full grown, they burrow into the wood to a depth of 1 inch or more, and at the end of their tunnels construct chambers in which to pass the winter. The following spring they change first to pupae and then to adult beetles (fig. 2).

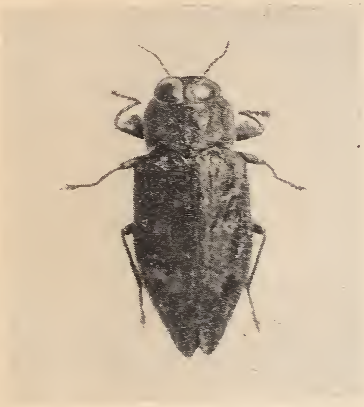

Figure 2.—Adult flatheaded apple tree borer. Enlarged.

The beetles issue from the wood through the tunnels they made as larvae. They appear soon after the apple trees bloom and are active for several weeks, laying eggs for the next brood in cracks or openings in the bark. On hot, clear days they may be found on the sunny side of the trunk and larger branches. The beetles are about ½ inch long, dark brown, with indistinct spots and bands of gray, and have a brassy sheen under certain light. The back beneath the wings is a metallic greenish blue, and the under parts of the body are bronze.

Control Methods

Because flatheaded borers rarely injure strong, healthy trees, an important means of controlling them is to use cultural methods that will keep the trees vigorous, such as proper cultivation, fertilizing, spraying, pruning, and watering. The use of insecticides to repel the beetles or to kill the larvae in their burrows has not given consistently good results in all areas, and is not recommended.

Wrapping the trunks of newly transplanted trees from the ground to the lower limbs will greatly reduce egg laying. Newspaper, crepe paper of double thickness with asphalt between the layers, and burlap have proved satisfactory for wrapping. Wind them spirally or vertically and hold them in place with a light cord. Apply the wrappings soon after apple trees bloom, and leave them in place until the trees become established or as long as they are serviceable, provided the cord ties do not girdle the trees.

Shading the trunk of newly transplanted trees with a board driven into the ground on the south side of the tree, close to the trunk will also prevent some egg laying. The board should be about 6 inches wide and slightly longer than the trunk.

Do not leave dying trees and newly cut logs and prunings in or near the orchard from one season to another, because the beetles may fly from them to the orchard trees.

The Roundheaded Apple Tree Borer [2]

The roundheaded apple tree borer is found in the eastern half of the United States and Canada and as far west as Texas and Nebraska. In the east it is the most destructive borer that attacks apple trees, but it does not infest so many other kinds of trees as do the flatheaded borer and the shot-hole borer.

The feeding of the roundheaded borers greatly weakens the trees and kills many of them. Trees of all sizes are attacked but mostly those from 3 to 10 years old, especially if they have not been sprayed. Orchard trees near an abundant growth of wild trees in which borers are breeding are most seriously affected. As the borers feed, they make small holes in the bark, through which they throw out reddish sawdustlike castings. Infested trees may be detected from these castings. The adult beetles feed on the bark of twigs and on the midribs and stems of leaves, but they seldom cause any injury to the trees. They seem to like the moisture in the castings thrown out by the larvae.

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[2] *Saperda candida* F.

Appearance and Development

In the northern part of the infested region the roundheaded borers usually complete their life cycle in 3 years, although some require only 2 and others 4 years. Farther south most of them require only 2 years.

The adult beetle (fig. 3) is about ¾ inch long. It is light brown above, with two broad white bands, joined in front, extending the full length of the back. The under part of the body and the front of the head are white.

Late in the spring or early in the summer the beetles emerge from the trees. All those in a given locality issue within 2 or 3 weeks. After they emerge they go to the branches of the trees, where they spend most of their lives resting in the foliage. The females make short flights in search of trees in which to lay their eggs. Where suitable trees are abundant, they usually stay within a few rods of the trees in which they develop.

About 10 days after they emerge, the females begin egg laying and continue for 40 to 50 days. They insert the eggs in a slightly curved opening in the bark, usually just above the surface of the ground. In the latitude of New York egg laying extends from the last of June to late in August, and in West Virginia and Maryland from the last of May to the middle of July.

The larva, or borer (fig. 4), is a

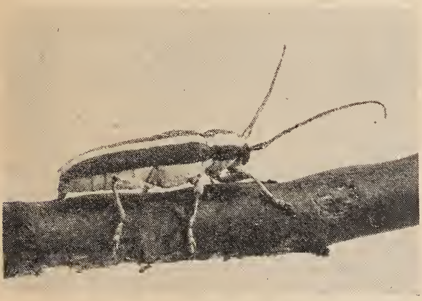

Figure 3.—Adult roundheaded apple tree borer. Enlarged.

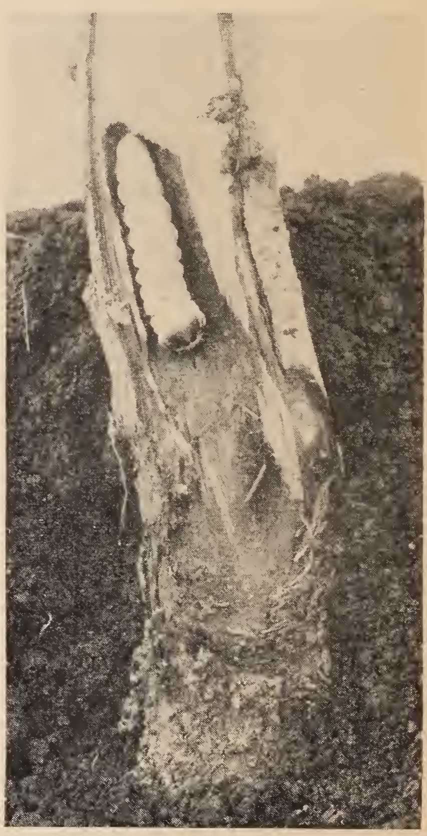

Figure 4.—Roundheaded apple tree borer in young apple tree. Enlarged.

whitish footless grub, with brown head and black jaws. When full grown it is nearly 1½ inches long. Upon hatching, the young borers attack the inner bark, where they continue to feed until late in the season. During the first season they feed and grow rapidly, and when several attack one tree they may completely girdle and kill it before winter. Their burrows at this time are broad, irregular, more or less circular galleries beneath the outer bark, near the point where the egg was laid.

The borers spend their first winter in the burrows near the ground. Early the next spring they resume feeding, attacking the solid wood almost exclusively and, in young trees, penetrating to the heart. During the second summer those that are to become adults the following year extend their burrows up the trunk ½ inch or more beneath the bark. Borers that do not become adults until they are 3 or 4 years old remain, feeding in the wood near the ground until the third or fourth summer. Then they too work their way up the trunk in the manner just described. When ready to emerge, the beetle gnaws a circular hole through the bark.

Control Methods

Roundheaded apple tree borers can be controlled by spraying, by injecting chemicals into the borer tunnel, or by worming. Infestations can be reduced by removing all wild host trees nearby.

To kill the beetles spray the trees with lead arsenate, using 3 pounds per 100 gallons, or 3 level teaspoonfuls per gallon, of water. Make two applications, one about 3 weeks after petal fall and another 2 to 3 weeks later.

***Caution.*—Lead arsenate is very poisonous. Store it in plainly labeled containers away from all food products.**

The injection of a chemical into the borer tunnels has been reported by the New York Agricultural Experiment Station[3] as the best method of controlling this insect. The safest effective materials are (1) a mixture of paradichlorobenzene and carbon disulfide (1 gram to 1 cc.), (2) dichloroethyl ether, (3) an alcoholic extract of pyrethrum (containing 1.5 to 2.5 percent of pyrethrins), and (4) a 1.5-percent extract of rotenone. The last two materials may be used alone or diluted 1 part to 4 parts of 95-percent alcohol. An injector developed for the purpose consists of a small tank for holding the insecticide, a built-in pressure pump, a pressure gage, and a small flexible metal nozzle with a tip. To treat an infested tree, push the nozzle into the borer tunnel as far as it will go, and press the trigger. Keep the pressure at 20 to 30 pounds per square inch. If a suitable injector is not available, use an oil can, but the control will not be quite so high.

***Caution.*— The paradichlorobenzene-carbon disulfide mixture is highly inflammable. Handle it with care. Do not let it get into the eyes, as it may cause a very painful burning sensation.**

You can remove the borers from trees with a knife and a piece of wire with a hooked tip. This method is called worming. It is one of the oldest and, when thoroughly done, one of the best ways of destroying this insect after it has become established in the trees. To aid in locating the borers, first clear away the litter about the bases of the trees. You can usually cut out the younger borers with a knife, but take care not to cut away any more wood than is necessary. You can kill the older ones by probing with a wire. If you do the cutting carefully and remove the borer, the wound will usually heal without noticeable injury to the tree, although it is well to cover the wound with lead paint.

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[3] Hess, A. D. THE BIOLOGY AND CONTROL OF THE ROUND-HEADED APPLE-TREE BORER, SAPERDA CANDIDA FABRICIUS. N. Y. (Geneva) Agr. Expt. Sta. Bul. 688, 93 pp. 1940.

Worm the trees early in the fall—by September 1 in the latitude of West Virginia and Maryland, slightly earlier farther south, and later farther north. Examine them again the following spring, and remove any borers that may have been missed in the fall.

Keeping the trees healthy and vigorous by proper cultivation, fertilization, pest control, and watering will help the infested trees to overcome the effects of borer injury.

If you depend on worming for control, be sure to examine nearby wild host trees, such as serviceberry, mountain-ash, wild crab, and thorn, and treat or destroy any that are infested.

The Shot-Hole Borer[4]

The shot-hole borer, sometimes called the fruit-tree bark beetle, attacks most kinds of deciduous fruit trees. It is found in all States east of the Mississippi River and in many localities farther west, as well as in Canada. It prefers trees dying from neglect, lack of moisture, diseases, or injuries caused by animals or other insects, although if very abundant it may attack healthy trees.

Both the larvae and adult beetles burrow between the bark and the sapwood, forming centipedelike figures in the wood. In this way they destroy the vital part of the tree and may cause serious damage in a short time.

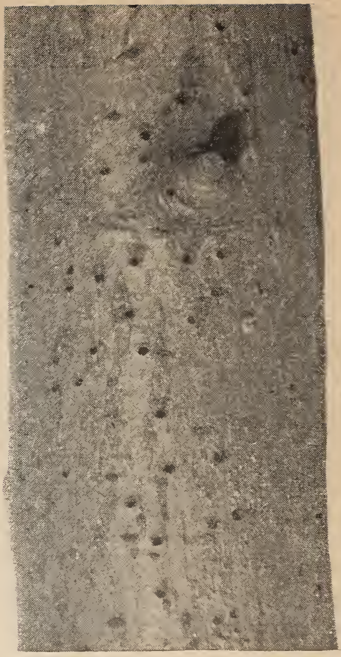

Figure 5.—Exit holes of shot-hole borer in section of trunk of young apple tree.

In entering and leaving the wood the beetles make conspicuous holes in the bark (fig. 5); hence the common name "shot-hole borer." Because these holes attract the attention of orchard owners, the death of trees is sometimes attributed to beetle injury, whereas it is almost always due primarily to some other cause.

Appearance and Development

The adult beetle is about 1/10 inch long, and dark brown or black (fig. 6). The beetles appear in the spring, from April to June according to the latitude. The female gnaws a hole about 1/20 inch in diameter through the bark and then makes a slightly larger burrow 1½ to 2 inches long about parallel with the grain of the wood, mining out small niches into which she deposits white eggs.

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[4] *Scolytus rugulosus* (Ratz.).

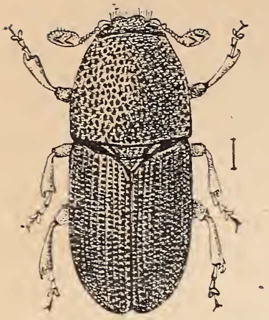

Figure 6.—Adult shot-hole borer. Enlarged.

These eggs hatch into small footless larvae, or borers, white with reddish heads. The borers burrow and feed on the sapwood for 30 to 36 days. They are then $\frac{1}{10}$ inch long and full grown. After a short resting period, they transform to adult beetles and gnaw their way out through the bark.

A few days after they emerge, the young beetles begin to deposit eggs, and thus start a second brood of larvae, which will feed in the trees during the latter part of the season. In the northern half of the region where the shot-hole borer is found, the second-brood larvae spend the winter in the trees and become beetles early the following spring. Farther south, however, these larvae become adults before winter and deposit eggs from which a third brood of larvae hatches.

Control Methods

To control the shot-hole borer, destroy dying or injured trees in which it breeds. Remove infested branches and broken or weak ones that might become infested. Keep the trees vigorous by cultivating, fertilizing, and watering them, and by controlling insects and diseases that sap their vitality.

You can prevent some egg laying by keeping the trunk and larger lower limbs thoroughly coated with whitewash. Three applications may be needed—one early in the spring, another about midsummer, and a third in the fall. If the mixture is thick, apply a single coat with a broom or brush. However, if you use a mixture thin enough for application with a spray pump, you will need to apply two coats. A handful of table salt added to each pail of whitewash will make it stick better. The whitewash will have no effect on insects already in the trees.

Tests in the Pacific Northwest indicate that adult shot-hole borers can be killed by spraying infested limbs or trees with DDT. Use 1 pound of technical DDT (2 pounds of a 50-percent wettable powder) to 100 gallons, or 5 level teaspoonfuls to 1 gallon, of spray when adult beetles are present in maximum numbers. Wet all limbs thoroughly with the spray.

***Caution.*—DDT is poisonous. Store it in plainly labeled containers away from all food products.**

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